

North Dakota Hard Red Spring Wheat Variety Trial Results for 2016 and Selection Guide

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Hard red spring (HRS) wheat was harvested from 6.2 million acres in 2016, down slightly from 2015. The average yield of spring wheat was 47 bushels/acre (bu/a), a bushel lower than last year.

SY Soren was the most popular HRS wheat variety in 2016, occupying 15.4 percent of the planted acreage, followed by SY Ingmar (11.5), Elgin-ND (8.7), Barlow (8.0) Glenn (7.9), Faller (7.3) and Prosper (6.6). SY Soren and SY Ingmar were released by Syngenta/AgriPro. All other varieties are NDSU releases.

Spring wheat generally was planted early in 2016 due to an early spring. Temperatures were moderate during much of the growing season, which helped the development of relatively high yield potential. We did not experience the yield losses due to the yellow rust that we saw in 2015. Scab caused elevated levels of DON in a few regions. Excessive moisture in NE North Dakota reduced yield and increased damage due to scab.

Successful wheat production depends on numerous factors, including selecting the right variety for a particular area. The information included in this publication is meant to aid in selecting that variety or group of varieties. Characteristics to consider in selecting a variety may include yield potential, protein content when grown with proper fertility, straw strength, plant height, reaction to problematic pests (diseases, insects, etc.) and maturity. Every growing season differs; therefore, when selecting a variety, we recommend using data that summarize several years and locations. Choose the variety that, on average, performs the best at multiple locations near your farm during several years.

Selecting varieties with good milling and baking quality also is important to maintain market recognition and avoid discounts. Hard red spring wheat from the northern Great Plains is known around the world for its excellent end-use quality. Millers and bakers consider many factors in determining the quality and value of wheat they purchase. Several key parameters are: high test weight (for optimum milling yield and flour color), high falling number (greater than 300 seconds indicates minimal sprout

damage), high protein content (the majority of HRS wheat export markets want at least 14 percent protein) and excellent protein quality (for superior bread-making quality as indicated by traditional strong gluten proteins, high baking absorption and large bread loaf volume).

Gluten strength, and milling and baking quality ratings, are provided for individual varieties based on the results from the NDSU field plot variety trials. These ratings are applied to varieties grown for multiple years at seven NDSU Research Extension Centers across the state to provide producers and end users with end-use performance data. The wheat protein data often are higher than obtained in actual production fields but can be used to compare differences among varieties.

The agronomic data presented in this publication are from replicated research plots using experimental designs that enable the use of statistical analysis. These analyses enable the reader to determine, at a predetermined level of confidence, if the differences observed among varieties are reliable or if they might be due to error inherent in the experimental process.

The LSD (least significant difference) values beneath the columns in the tables are derived from these statistical analyses and apply only to the numbers in the column in which they appear. If the difference between two varieties exceeds the LSD value, it means that with 95 or 90 percent confidence (LSD probability 0.05 or 0.10), the higher-yielding variety has a significant yield advantage. When the difference between two varieties is less than the LSD value, no significant difference was found between those two varieties under those growing conditions.

NS is used to indicate no significant difference for that trait among any of the varieties at the 95 or 90 percent level of confidence. The CV stands for coefficient of variation and is expressed as a percentage. The CV is a measure of variability in the trial. Large CVs mean a large amount of variation that could not be attributed to differences in the varieties. Yield is reported at 13.5 percent moisture, while protein content is reported at 12 percent moisture content.

Presentation of data for the entries tested does not imply approval or endorsement by the authors or agencies conducting the test. North Dakota State University approves the reproduction of any table in the publication only if no portion is deleted, appropriate footnotes are given and the order of the data is not rearranged. Additional data from county sites are available from each Research Extension Center at www.ag.ndsu.edu/varietytrials/spring-wheat.

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Table 1. North Dakota hard red spring wheat variety descriptions, agronomic traits, 2016.

Variety	Agent or Origin ¹	Year Released	Height (inches)	Straw Strength ²	Days to Head ³	Reaction to Disease ⁴					
						Stem Rust ⁵	Leaf Rust	Stripe Rust ⁵	Tan Spot	Bact. Leaf	Head Scab
Barlow	ND	2009	35	6	62	R	MS	M	MS	MS/S	M
Bolles	MN	2015	32	4	66	R/MR	MR	MR	MR	S	M
Boost	SD	2016	30	5	64	NA	NA	NA	NA	NA	MR
Brennan	AgriPro	2009	30	4	62	R	MR	M	MS	S	MS
Duclair6	MT	2011	31	4	65	R	MR	NA	S	S	MS
Egan	MT	2014	35	NA	65	NA	NA	NA	NA	NA	NA
Elgin-ND	ND	2012	36	5	65	R	MS	M	MS	MS/S	M
Faller	ND	2007	35	5	65	R	S	S	MS	MS	M
Focus	SD	2015	35	5	60	R	MR/MS	MS	S	MS/S	MR
Forefront	SD	2012	37	5	61	R/MR	MR	MS	S	S	MR
Glenn	ND	2005	37	4	61	R	MS	M	MS	M/MS	MR
HRS 3361	Croplan	2013	33	3	65	NA	MR	MS	NA	NA	M
HRS 3378	Croplan	2013	32	4	64	NA	MR	MS	NA	NA	M
HRS 3419	Croplan	2014	32	2	68	NA	MR	R	NA	NA	MR
HRS 3504	Croplan	2015	31	3	67	NA	NA	NA	NA	NA	NA
HRS 3530	Croplan	2015	36	4	68	NA	MS	S	NA	NA	NA
HRS 3616	Croplan	2016	32	4	64	NA	NA	NA	NA	NA	NA
Jenna	AgriPro	2009	32	4	66	R	MR	M	M	M/MS	M
LCS Albany	Limagrain	2008	32	5	67	R	MR	MS	R	MS	M
LCS Anchor	Limagrain	2016	31	3	64	NA	NA	NA	NA	NA	NA
LCS Breakaway	Limagrain	2011	32	5	63	R	R	MS	MR	MS	M
LCS Iguacu	Limagrain	2014	33	3	66	R	MS	MS	R	MS/S	M
LCS Nitro	Limagrain	2015	32	4	65	R/MR	R	MR	R	M	M
LCS Powerplay	Limagrain	2011	33	5	65	R	MS	M	S	MS	M
LCS Prime	Limagrain	2015	33	4	61	NA	MS	NA	NA	NA	MR
LCS Pro	Limagrain	2015	32	5	66	R	MS	NA	S	S	M
Linkert	MN	2013	31	2	63	R	MR	R	MR	MS/S	M
Mott ⁶	ND	2009	36	3	66	R	MS	MS	MS	S	MS
MS Chevelle	Meridian	2014	30	5	63	R	MR	MR	MS	MS	M
MS Stingray	Meridian	2013	35	3	67	R	MS	S	R	M	MR
ND901CLPlus ⁷	ND	2010	36	4	60	MR	MR/MS	NA	NA	NA	M
Prestige	Pulse-USA	2015	31	3	62	NA	MS	NA	NA	NA	NA
Prevail	SD	2014	31	4	64	R/MR/MS	MR	MR	MR	M/MS	M
Prosper	ND	2011	35	5	65	R	MS	S	MS	MS/S	M
RB07	MN	2007	32	5	62	R	MS	NA	MR	S	MR
Redstone	Pulse-USA	2014	32	3	67	NA	R	NA	NA	NA	NA
Rollag	MN	2011	32	3	63	R	MR/MS	R	R	M/MS	MR
Shelly	MN	2016	34	5	65	NA	MR/MS	NA	NA	NA	M
Surpass	SD	2016	31	5	59	NA	MR/MS	NA	NA	NA	MR

Table 1. (continued) North Dakota hard red spring wheat variety descriptions, agronomic traits, 2016.

Variety	Agent or Origin ¹	Year Released	Height (inches)	Straw Strength ²	Days to Head ³	Reaction to Disease ⁴					
						Stem Rust ⁵	Leaf Rust	Stripe Rust ⁵	Tan Spot	Bact. Leaf	Head Scab
SY Ingmar	Syngenta/AgriPro	2014	31	3	64	R	MR	MS	MS	S	M
SY Rowyn	Syngenta/AgriPro	2013	31	4	62	R	MR	M	R	M/MS	M
SY Soren	Syngenta/AgriPro	2011	30	3	63	R	MR	MS	R	S	M
SY Tyra6	Syngenta/AgriPro	2011	31	5	62	R	R	R	MS	S	S
SY Valda	Syngenta/AgriPro	2015	31	4	64	R	R	MS	MS	S	MR
SY605CL7	Syngenta/AgriPro	2009	34	7	62	R/MR	MR/MS	NA	MS	NA	S
TCG-Cornerstone	21st Century Genetics	2015	31	4	64	NA	MR/MS	NA	NA	NA	MS
TCG-Spittfire	21st Century Genetics	2015	36	4	66	NA	MS	NA	NA	NA	MS
TCG-Wildfire	21st Century Genetics	2015	37	5	64	NA	MS	NA	NA	NA	MS
Velva	ND	2011	35	4	63	R	MS	MS	R	M/MS	MS
WB9312	WestBred	2016	30	4	63	NA	MR	NA	NA	NA	NA
WB9507	WestBred	2013	32	5	61	R/MR	MR	S	MR	S	MR
WB9653	WestBred	2015	31	4	65	R/MR	MR	S	MS	S	M
WB-Mayville	WestBred	2011	30	3	63	R	R	MS	MS	S	S

¹ Refers to agent or developer: MN = University of Minnesota; MT = Montana State University; ND = North Dakota State University; SD = South Dakota State University; **Bold** varieties are those recently released, so data is limited and rating values may change.

² Straw Strength = 1 to 9 scale, with 1 the strongest and 9 the weakest. These values are based on recent data and may change as more data become available.

³ Days to Head = the number of days from planting to head emergence from the boot averaged from several locations.

⁴ R = resistant; MR = moderately resistant; M = intermediate; MS = moderately susceptible; NA = Not adequately tested; S = susceptible.

⁵ Fargo stem rust nursery inoculated with *Puccinia graminis* f. sp. *Tritici* races TPMK, TMLK, RTQQ, QFCQ and QTHJ.

⁶ Solid stemmed or semisolid stem, imparting resistance to sawfly.

⁷ CL = Refers to a Clearfield variety, with tolerance to the Beyond™ family of herbicides.

Table 2. Analytical milling and baking data from field plot variety trials at Carrington, Casselton and Langdon in 2014 and 2015 (unless otherwise noted).

Variety	Planted 2016 Eastern ND	OBS ¹	Test Weight (lb/bu)	Protein 12% MB (%)	Vitreous Kernels (%)	Falling Number (seconds)	Farinograph Stability (minutes)	Farinograph Absorption (%)	Loaf Volume (cc)	Mill and Bake Quality Rating (1-5 Stars) ²
	(% area)									
Barlow	2.8	5	62.3	13.8	70	366	7.3	64.7	946	***
Bolles	--	5	61.9	14.6	83	401	12.1	61.5	966	****
Elgin-ND	5.9	5	61.5	13.4	66	390	8.3	62.6	920	***
Faller	12.6	5	61.5	12.6	63	394	7.2	61.3	908	***
Glenn ³	5.0	5	64.1	14.5	78	375	10.2	64.2	958	*****
Linkert	8.6	5	61.6	14.3	54	420	13.8	62.0	980	****
Prevail	--	5	61.6	13.3	46	396	6.6	60.7	958	**
Prosper	8.4	5	61.6	12.3	48	383	7.2	61.0	872	***
Rollag	4.1	5	62.6	14.4	80	448	5.7	66.3	879	*
SY Ingmar	11.9	5	62.2	14.0	78	417	8.8	61.3	1004	***
SY Rowyn	1.4	5	61.7	12.8	54	439	11.8	59.7	948	****
SY Soren	12.4	5	62.4	13.7	51	433	7.1	62.3	963	***
WB9507	--	3	59.0	12.7	58	430	9.4	60.6	947	***
WB-Mayville	6.6	5	61.0	13.7	68	389	8.2	62.5	928	***

Analyses conducted at the NDSU Hard Red Spring Wheat Quality Laboratory in Fargo, N.D. ¹ Observations. ² Mill and Bake Quality Rating scale 1 to 5, with 1 being low and 5 being superior. ³ Glenn is the current Wheat Quality Council check variety for comparing new experimental lines and newly released varieties. 2015 Carrington data omitted due to poor quality.

Table 3. Analytical milling and baking data from field plot variety trials at Dickinson, Hettinger, Minot and Williston in 2014 and 2015. (unless otherwise noted).

Variety	Planted 2016 Western ND	OBS ¹	Test Weight (lb/bu)	Protein 12% MB (%)	Vitreous Kernels (%)	Falling Number (seconds)	Farinograph Stability (minutes)	Farinograph Absorption (%)	Loaf Volume (cc)	Mill and Bake Quality Rating (1-5) ²
	(% area)									
Barlow	11.8	7	61.7	13.7	58	346	8.3	62.8	939	***
Bolles	--	7	59.7	15.0	52	392	24.6	60.8	978	****
Elgin-ND	10.8	7	60.9	13.2	38	374	9.6	61.0	876	***
Faller	3.4	7	60.5	12.7	43	374	7.6	60.1	870	***
Glenn ³	9.9	7	63.3	13.8	64	360	9.7	61.8	924	*****
Linkert	0.7	7	60.9	13.9	43	396	20.7	60.8	933	****
Prevail	--	7	60.2	12.7	27	311	8.7	56.9	903	**
Prosper	5.3	7	60.6	13.1	41	362	7.7	60.7	924	***
Rollag	2.3	6	61.5	14.1	49	450	6.8	64.6	888	*
SY Ingmar	11.1	5	61.8	14.4	61	408	10.2	60.3	974	***
SY Rowyn	0.7	6	61.0	13.2	45	408	19.6	59.1	941	****
SY Soren	17.6	6	62.0	14.0	40	411	7.8	61.0	959	***
WB 9507	--	5	58.9	13.6	42	370	8.3	61.9	976	***
WB Mayville	0.5	6	61.1	13.8	54	381	9.6	61.9	931	***

Analyses conducted at the NDSU Hard Red Spring Wheat Quality Laboratory in Fargo, N.D. ¹ Observations ² Mill and Bake Quality Rating scale 1 to 5, with 1 being low and 5 being superior. ³ Glenn is the current Wheat Quality Council check variety for comparing new experimental lines and newly released varieties. 2015 Dickinson data omitted due to poor quality.

Table 4. Yield of hard red spring wheat varieties grown at three locations in eastern North Dakota, 2014-2016.

Variety	Casselton		Prosper		Langdon		Avg. eastern N.D.	
	2016	3 Yr.	2016	3 Yr.	2016	3 Yr.	2016	3 Yr.
	------(bu/a)-----							
Barlow	80.0	73.9	73.3	71.4	59.6	72.9	71.0	72.7
Bolles	69.9	--	65.8	--	62.6	73.8	66.1	--
Boost	79.0	--	67.3	--	60.5	72.6	68.9	--
Elgin-ND	78.0	76.9	74.1	70.0	64.7	75.9	72.3	74.3
Faller	72.0	77.9	80.8	74.2	79.0	82.9	77.3	78.3
Focus	85.0	--	70.8	--	53.1	66.2	69.6	--
Glenn ⁴	67.1	67.5	66.9	69.7	64.3	71.6	66.1	69.6
HRS 3361	78.3	--	81.7	--	70.5	73.8	76.8	--
HRS 3419	82.7	--	86.4	--	78.9	83.5	82.7	--
HRS 3504	82.3	--	85.3	--	73.2	--	80.3	--
HRS 3530	87.8	--	93.6	--	78.1	--	86.5	--
HRS 3616	76.7	--	75.4	--	65.9	--	72.7	--
LCS Anchor	--	--	--	--	59.5	--	--	--
LCS Breakaway	79.0	75.6	79.1	74.8	70.9	73.9	76.3	74.8
LCS Iguacu	76.6	79.7	85.3	77.9	75.7	79.9	79.2	79.2
LCS Nitro	82.2	--	82.4	--	77.8	81.3	80.8	--
LCS Prime	73.3	--	75.2	--	68.7	--	72.4	--
LCS Pro	79.3	--	74.8	--	67.8	--	74.0	--
Linkert	72.0	74.9	75.5	73.2	62.8	73.5	70.1	73.9
MS Chevelle	76.0	72.8	78.5	75.6	67.7	79.7	74.1	76.0
MS Stingray	87.1	82.6	87.8	73.1	75.6	77.0	83.5	77.6
Prestige	79.1	--	73.1	--	67.8	--	73.3	--
Prevail	82.4	--	88.4	--	65.9	74.8	78.9	--
Prosper	75.4	75.8	75.5	72.6	77.8	80.5	76.2	76.3
Redstone	80.1	--	75.2	--	75.9	--	77.1	--
Rollag	75.5	79.3	74.1	73.5	71.2	77.1	73.6	76.6
Shelly	82.7	--	81.6	--	71.1	--	78.5	--
Surpass	89.3	--	82.2	--	58.5	--	76.7	--
SY Ingmar	83.1	80.4	76.6	71.4	70.0	77.0	76.6	76.3
SY Rowyn	85.6	81.0	88.5	77.4	67.2	77.3	80.4	78.6
SY Soren	78.0	72.5	70.8	67.0	68.9	76.0	72.6	71.8
SY Valda	87.8	--	91.1	--	78.4	--	85.8	--
TCG-Cornerstone	70.9	--	75.9	--	58.3	--	68.4	--
TCG-Spitfire	75.5	--	80.2	--	58.2	--	71.3	--
TCG-Wildfire	84.3	--	79.2	--	64.2	--	75.9	--
Velva	71.4	69.5	64.5	61.4	52.6	--	62.8	--
WB9312	83.0	--	87.6	--	--	--	--	--
WB9507	83.6	--	81.9	--	76.6	74.7	80.7	--
WB9653	86.7	--	90.4	--	76.1	--	84.4	--
WB-Mayville	78.8	71.6	79.3	72.6	56.9	68.1	71.7	70.8
Mean	79.4	75.7	78.9	72.2	68.0	75.8	75.4	75.1
CV%	6.8	--	7.1	--	8.7	--	6.4	3.6
LSD 0.05	7.3	--	7.5	--	8.1	--	7.8	4.6
LSD 0.10	6.1	--	6.3	--	6.8	--	6.3	3.8

Table 5. Yield of hard red spring wheat varieties grown at four locations in western North Dakota, 2014-2016

Variety	Dickinson		Hettinger		Minot		Williston		Avg. western N.D.	
	2016	3 Yr.	2016	3 Yr.	2016	3 Yr.	2016	3 Yr.	2016	3 Yr.
	------(bu/a)-----									
Barlow	48.5	69.6	48.4	64.6	63.6	64.8	52.8	38.6	53.3	59.4
Bolles	47.5	68.4	44.0	64.8	70.2	68.1	45.6	--	51.8	--
Boost	52.3	68.6	50.6	66.1	66.0	--	48.5	40.8	54.4	--
Duclair	49.8	67.4	48.5	--	84.4	74.5	53.0	41.6	58.9	--
Egan	45.4	--	51.6	--	71.0	--	48.4	--	54.1	--
Elgin-ND	48.5	69.6	48.5	70.5	80.0	71.6	57.2	43.0	58.6	63.7
Faller	47.1	70.1	43.4	72.3	84.2	81.0	53.5	39.5	57.1	65.7
Focus	49.6	--	48.2	66.0	65.3	--	54.7	--	54.5	--
Glenn ⁴	51.2	68.3	49.1	63.1	76.4	67.3	52.7	38.7	57.4	59.4
HRS 3361	55.3	67.8	44.6	66.1	90.2	72.5	51.8	--	60.5	51.6
HRS 3419	60.5	69.0	54.7	79.8	83.8	77.9	56.9	--	64.0	--
HRS 3504	65.0	--	48.3	--	83.6	--	59.8	--	64.2	--
HRS 3530	59.1	--	43.7	--	73.5	--	54.0	--	57.6	--
HRS 3616	48.9	--	48.6	--	75.6	--	52.2	--	56.3	--
LCS Anchor	51.7	--	52.6	--	72.5	--	55.2	--	58.0	--
LCS Breakaway	51.2	72.6	48.4	66.3	86.9	73.4	49.8	38.2	59.1	62.6
LCS Iguacu	54.0	71.0	47.5	69.5	75.4	71.3	50.7	41.6	56.9	63.4
LCS Nitro	57.0	74.4	44.9	74.0	109.1	85.7	52.5	42.4	65.9	69.1
LCS Prime	60.5	--	49.1	--	77.7	--	55.9	--	60.8	--
LCS Pro	60.7	76.9	49.7	64.6	81.2	71.5	57.1	45.3	62.2	64.6
Linkert	52.9	70.4	43.6	62.6	77.5	69.1	51.3	41.8	56.3	61.0
Mott	57.7	--	46.4	63.9	66.9	68.5	53.3	42.7	56.1	43.8
MS Chevelle	52.1	69.4	47.8	71.7	86.7	73.5	57.8	--	61.1	--
MS Stingray	45.1	65.4	43.2	71.0	99.1	86.4	55.4	--	60.7	--
ND901CLPlus	49.5	65.4	41.5	58.1	69.9	68.2	53.0	40.6	53.5	58.1
Prestige	54.1	--	45.8	--	74.2	--	51.4	--	56.4	--
Prevail	57.5	65.4	49.3	70.6	64.2	71.6	57.9	45.4	57.2	63.3
Prosper	55.0	71.6	36.0	64.2	93.8	82.4	51.2	41.1	59.0	64.8
Redstone	56.6	--	47.0	--	86.2	--	56.9	--	61.7	--
Rollag	52.6	71.5	47.3	67.8	74.6	73.2	53.7	41.1	57.1	63.4
Shelly	48.7	--	50.9	--	71.2	--	51.6	--	55.6	--
Surpass	56.2	--	49.7	--	68.6	--	54.8	--	57.3	--
SY Ingmar	56.7	73.6	48.1	65.7	84.6	78.0	51.9	42.9	60.3	65.1
SY Rowyn	58.6	72.7	48.8	69.4	70.5	75.1	50.8	39.5	57.2	64.2
SY Soren	50.1	69.2	50.1	69.4	68.6	68.3	54.4	40.7	55.8	61.9
SY Tyra	51.9	71.9	46.6	66.3	74.2	--	53.8	42.6	56.6	45.2
SY Valda	63.5	--	49.6	--	77.1	--	55.4	--	61.4	--
SY605CL	45.9	69.2	49.0	67.9	73.3	70.7	55.2	41.6	55.9	62.4

Table 5. (continued) Yield of hard red spring wheat varieties grown at four locations in western North Dakota, 2014-2016

Variety	Dickinson		Hettinger		Minot		Williston		Avg. western N.D.	
	2016	3 Yr.	2016	3 Yr.	2016	3 Yr.	2016	3 Yr.	2016	3 Yr.
	------(bu/a)-----									
TCG-Cornerstone	52.0	--	43.2	--	60.7	--	47.5		50.9	--
TCG-Spitfire	59.7	--	52.0	--	87.7	--	55.0		63.6	--
TCG-Wildfire	52.0	--	45.3	--	71.5	--	53.4		55.6	--
Velva	55.3	72.8	43.0	63.4	80.0	70.6	58.9	46.5	59.3	63.3
WB9312	56.1	--	39.1	--	77.3	--	48.9	--	55.4	--
WB9507	52.8	71.0	36.2	64.9	73.3	73.6	52.8	42.2	53.8	62.9
WB9653	61.8	--	45.8	--	87.5	--	56.3	--	62.9	--
WB-Mayville	53.7	73.5	45.9	61.9	69.7	67.5	52.6	42.5	55.5	61.4
Mean	53.7	70.2	46.9	67.1	77.4	73.2	53.4	41.7	57.9	60.9
CV %	10.4	--	7.1	--	10.5	--	7.1	--	10.0	6.9
LSD 0.05	7.6	--	4.7	--	13.1	--	5.3	--	8.1	6.1
LSD 0.10	6.4	--	4.0	--	11.0	--	4.4	--	6.7	5.1

Table 6. Protein at 12 percent moisture of hard red spring wheat varieties grown at seven locations in North Dakota, 2016.

Variety	Casselton	Prosper	Dickinson	Hettinger	Langdon	Minot	Williston	State Avg.
	------(%)-----							
Barlow	13.9	15.3	14.8	14.5	14.8	14.8	14.2	14.6
Bolles	15.3	16.9	16.3	15.8	15.9	15.4	16.0	15.9
Boost	14.4	15.5	15.7	14.7	15.0	15.2	15.2	15.1
Duclair	14.0	14.8	13.9	13.5	--	14.6	13.9	--
Egan	15.2	15.5	15.1	14.8	--	15.8	15.7	--
Elgin-ND	13.7	14.9	13.9	14.6	14.9	14.9	14.1	14.4
Faller	13.4	14.1	14.1	13.2	13.6	13.8	13.4	13.7
Focus	13.5	15.2	14.5	13.4	14.3	14.3	13.9	14.2
Glenn ⁴	13.7	14.8	15.3	14.9	14.7	15.0	13.9	14.6
HRS 3361	13.5	14.3	14.0	13.6	13.8	14.4	13.8	13.9
HRS 3419	13.0	13.8	12.2	13.4	13.3	13.3	14.0	13.3
HRS 3504	13.8	14.3	12.7	13.4	13.4	14.5	13.3	13.6
HRS 3530	14.4	15.0	14.4	14.2	14.3	14.2	14.0	14.4
HRS 3616	14.4	15.9	14.3	14.3	15.3	15.4	14.7	14.9
LCS Anchor	--	--	15.5	13.9	14.7	14.9	14.6	--
LCS Breakaway	14.3	15.4	13.4	13.6	14.1	15.0	14.9	14.4
LCS Iguacu	12.3	13.3	12.8	12.3	12.4	13.7	13.1	12.8
LCS Nitro	13.1	14.0	13.8	13.4	13.3	13.3	13.5	13.5
LCS Prime	13.1	13.9	13.3	13.0	13.5	13.0	12.8	13.2
LCS Pro	14.4	15.4	13.7	14.0	14.4	14.9	13.5	14.3
Linkert	14.3	15.2	14.7	14.7	15.1	15.4	14.6	14.9
Mott	13.9	14.9	12.5	14.5	--	14.7	15.1	--
MS Chevelle	13.0	14.3	12.6	12.9	13.4	13.4	13.2	13.3
MS Stingray	11.6	12.8	15.0	12.6	11.6	12.2	12.3	12.6
ND901CLPlus	14.9	15.8	14.9	15.2	--	16.6	15.5	--
Prestige	14.0	14.7	13.8	13.4	14.5	14.7	14.1	14.2
Prevail	13.3	14.3	13.7	13.6	14.3	13.9	13.6	13.8
Prosper	13.3	14.3	14.2	13.3	13.8	14.2	13.9	13.9
Redstone	13.6	14.8	12.4	13.4	13.4	13.2	13.7	13.5
Rollag	14.2	15.6	14.2	14.5	14.8	15.2	14.7	14.7
Shelly	13.0	14.4	13.4	13.7	14.0	14.0	13.4	13.7
Surpass	13.9	14.9	13.6	13.4	14.2	13.9	13.5	13.9
SY Ingmar	14.1	15.1	14.0	14.3	15.1	14.4	14.5	14.5
SY Rowyn	13.9	14.2	13.6	13.8	14.1	14.3	14.0	14.0
SY Soren	14.0	15.0	14.5	14.5	14.5	14.8	14.6	14.6
SY Tyra	13.7	14.5	13.3	13.3	--	13.6	13.6	--
SY Valda	13.5	14.3	12.9	13.4	13.9	14.0	13.6	13.7
SY605CL	14.4	15.9	14.1	14.2	--	14.7	14.2	--
TCG-Cornerstone	14.4	15.0	14.8	14.3	14.5	14.8	15.4	14.7

Table 6. (continued) Protein at 12 percent moisture of hard red spring wheat varieties grown at seven locations in North Dakota, 2016.

Variety	Casselton	Prosper	Dickinson	Hettinger	Langdon	Minot	Williston	State Avg.
	------(%)-----							
TCG-Spitfire	13.9	14.6	14.3	13.8	14.2	14.3	14.0	14.2
TCG-Wildfire	14.2	14.8	14.2	13.7	14.2	14.9	14.1	14.3
Velva	14.2	14.9	14.3	13.7	14.8	14.4	13.8	14.3
WB9312	12.6	12.8	12.8	12.2	--	12.8	13.2	--
WB9507	13.7	14.5	13.7	13.3	13.7	15.0	14.1	14.0
WB9653	13.3	14.1	14.3	13.2	13.4	14.0	13.7	13.7
WB-Mayville	14.6	15.3	15.1	13.9	14.7	14.9	14.6	14.7
Mean	13.8	14.7	14.0	13.8	14.2	14.4	14.1	14.1
CV %	3.5	2.5	5.1	3.7	2.8	3.1	3.4	2.9
LSD 0.05	0.7	0.5	1.4	0.7	0.6	0.7	0.7	0.4
LSD 0.10	0.6	0.4	1.2	0.6	0.5	0.6	0.6	0.3

Table 7. Test weight of hard red spring wheat varieties grown at seven locations in North Dakota, 2016.

Variety	Casselton	Prosper	Dickinson	Hettinger	Langdon	Minot	Williston	State Avg.
	------(lb/bu)-----							
Barlow	62.4	61.8	60.3	59.0	60.0	61.9	59.3	60.7
Bolles	60.6	59.3	58.2	58.8	60.2	60.9	56.5	59.2
Boost	61.4	61.0	61.1	57.6	58.5	59.6	57.5	59.5
Duclair	59.9	59.4	57.9	56.2	--	59.6	56.6	--
Egan	59.6	58.4	55.9	56.4	--	57.9	55.9	--
Elgin-ND	61.0	60.2	57.8	56.8	59.2	60.6	57.8	59.1
Faller	60.3	61.1	58.5	57.1	60.8	60.1	56.5	59.2
Focus	62.9	62.8	62.1	59.6	61.2	60.6	59.8	61.3
Glenn4	63.9	63.4	59.2	60.1	63.0	63.2	60.7	61.9
HRS 3361	60.3	59.8	59.9	57.6	58.7	60.1	56.6	59.0
HRS 3419	60.5	60.1	59.2	57.3	59.1	59.5	55.1	58.7
HRS 3504	60.9	60.0	61.4	56.7	58.2	60.1	56.9	59.2
HRS 3530	62.3	62.2	60.5	55.4	60.8	60.5	56.8	59.8
HRS 3616	60.4	60.1	61.3	57.2	59.4	60.9	57.4	59.5
LCS Anchor	--	--	60.9	59.4	59.3	61.6	59.1	--
LCS Breakaway	62.7	62.3	62.6	58.8	61.7	61.9	59.4	61.3
LCS Iguacu	62.0	62.6	60.2	60.2	60.7	60.5	58.7	60.7
LCS Nitro	60.9	60.1	57.6	57.3	60.0	60.4	56.1	58.9
LCS Prime	62.1	62.5	60.1	57.5	60.9	61.4	59.4	60.6
LCS Pro	62.4	61.4	62.1	58.3	61.1	61.6	57.6	60.6
Linkert	61.4	61.2	61.0	57.8	59.7	60.8	58.1	60.0
Mott	61.7	61.1	60.8	58.5	--	59.5	57.5	--

Table 7. (continued) Test weight of hard red spring wheat varieties grown at seven locations in North Dakota, 2016.

Variety	Casselton	Prosper	Dickinson	Hettinger	Langdon	Minot	Williston	State Avg.
	------(lb/bu)-----							
MS Chevelle	61.1	60.1	59.4	58.0	58.5	61.2	58.3	59.5
MS Stingray	60.2	59.8	58.5	55.7	58.8	55.5	56.9	57.9
ND901CLPlus	61.3	61.1	61.8	57.7	--	60.7	58.6	--
Prestige	60.7	60.3	59.1	58.3	59.4	60.1	56.1	59.1
Prevail	61.5	61.2	60.2	59.0	59.3	60.2	57.7	59.9
Prosper	60.3	60.5	59.5	54.9	60.9	60.8	57.3	59.2
Redstone	61.4	59.9	58.9	56.2	60.1	60.3	58.1	59.3
Rollag	62.5	61.7	60.7	58.8	61.3	61.2	57.6	60.5
Shelly	62.2	61.1	60.5	56.8	59.7	61.0	58.3	59.9
Surpass	61.0	61.4	60.7	58.8	59.4	61.0	57.8	60.0
SY Ingmar	62.0	60.6	62.4	58.8	60.9	61.1	57.7	60.5
SY Rowyn	61.6	61.6	60.5	58.3	60.1	61.1	57.1	60.0
SY Soren	60.6	59.4	59.5	57.9	60.6	61.4	58.4	59.7
SY Tyra	60.0	58.7	61.0	57.6	--	57.3	58.6	--
SY Valda	61.7	61.9	61.0	57.7	60.5	57.4	57.9	59.7
SY605CL	61.7	60.4	58.7	59.1	--	62.0	59.1	--
TCG-Cornerstone	61.2	60.9	59.2	57.1	59.5	61.5	57.5	59.6
TCG-Spitfire	59.7	59.4	60.6	56.1	59.0	58.6	57.2	58.7
TCG-Wildfire	61.8	60.7	58.6	58.5	59.4	59.8	58.3	59.6
Velva	60.2	59.3	60.1	56.2	57.7	59.1	58.2	58.7
WB9312	60.5	61.6	61.4	55.8	--	61.3	57.8	--
WB9507	59.3	59.3	59.2	53.9	59.2	59.0	55.1	57.9
WB9653	61.2	60.8	60.4	56.8	58.5	60.5	57.6	59.4
WB-Mayville	62.0	61.6	60.1	55.8	58.9	59.6	57.7	59.4
Mean	61.2	60.8	60.0	57.6	59.9	60.3	57.7	59.6
CV %	1.0	1.3	2.3	2.3	1.1	1.3	0.6	1.5
LSD 0.05	0.8	1.1	1.9	1.8	1.0	1.3	0.5	1.0
LSD 0.10	0.7	0.9	1.6	1.5	0.8	1.1	0.4	0.8